Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of the claims in the application:

Listing of Claims:

1. (Currently amended) A method for process monitoring, comprising:
receiving a sample having a first layer that is at least partly conductive and a second layer formed over the first layer, following production of contact openings in the second layer;

directing a beam of charged particles along a beam axis that deviates substantially in angle from a normal to a surface of the sample, so as to irradiate one or more of the contact openings in each of a plurality of locations distributed over at least a region of the sample, wherein the deviation in angle is greater than arctan(1/AR), wherein AR is the ratio of depth to diameter of the one or more contact openings;

measuring a specimen current flowing through the first layer in response to irradiation of the one or more of the contact openings at each of the plurality of locations; and

creating a map of at least the region of the sample indicating the specimen current measured in response to the irradiation at the plurality of the locations.

2. (Original) The method according to claim 1, and comprising measuring a secondary electron current emitted from the sample responsive to the beam of charged particles, and wherein creating the map comprises mapping the secondary electron current together with the specimen current.

3. (Original) The method according to claim 1, and comprising directing the beam of charged particles toward one or more reference locations that are adjacent to at least one of the plurality of locations of the irradiated contact openings, and

wherein measuring the specimen current comprises measuring reference values of the specimen current in response to the irradiation of the reference locations, and

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wherein creating the map comprises subtracting the reference values from the specimen current measured in response to the irradiation of the contact openings to generate subtracted current values, and using the subtracted current values in creating the map.

4. (Original) The method according to claim 1, wherein creating the map comprises assessing, based on the map, at least one of a characteristic depth and a characteristic width of the contact openings at each of the plurality of locations.

5. (Original) The method according to claim 1, wherein creating the map comprises assessing, based on the map, non- uniformities in a process used to create the contact openings.

6. (Original) The method according to claim 5, wherein assessing the non-uniformities comprises assessing variations over the region of the sample.

7. (Original) The method according to claim 5, wherein assessing the non-uniformities comprises assessing variations between different, first and second samples.

8. (Original) The method according to claim 5, and comprising applying corrective action to the process responsively to the map.

9. (Original) The method according to claim 1, wherein creating the map comprises assessing, based on the map, an alignment between the contact openings in the second layer and a structure in the first layer.

10. (Original) The method according to claim 1, wherein the sample comprises a semiconductor wafer.

11. (Original) The method according to claim 10, wherein at least some of the locations are located on different dies of the wafer.

12. (Original) The method according to claim 1, wherein directing the beam of charged particles comprises selecting the locations to irradiate such that the one or more of the contact openings in each location among the plurality of locations are characteristic of the contact openings in a respective area of the location.

13. (Original) The method according to claim 1, wherein at least one of the contact openings is a contact hole.

14. (Original) The method according to claim 1, wherein at least one of the contact openings is a trench.

15. (Original) The method according to claim 1, wherein the contact openings have side walls and a bottom, and wherein directing the beam of charged particles comprises angling the beam so that more of the charged particles strike the side walls than strike the bottom.

16. (Original) The method according to claim 1, wherein creating the map comprises assessing, based on the map, whether a contaminant residue is present within the contact openings.

17. (Original) The method according to claim 1, and comprising negatively precharging the surface of the sample in proximity the contact openings, so as to facilitate measurement of the specimen current.

18. (Currently Amended) Apparatus for testing a sample having a first layer that is at least partly conductive and a second layer formed over the first layer, following production of contact openings in the second layer, the apparatus comprising:

a particle beam source adapted to direct a beam of charged particles along a beam axis that deviates substantially in angle from a normal to a surface of the sample, so as to irradiate one or more of the contact openings in each of a plurality of locations distributed over at least a region of the sample, wherein the deviation in angle is greater than arctan(1/AR), wherein AR is the ratio of depth to diameter of the one or more contact openings;

a current measuring device adapted to measure a specimen current flowing through the first layer in response to irradiation of the one or more of the contact openings at each of the plurality of locations; and

a controller adapted to create a map of at least the region of the sample indicating the specimen current measured in response to the irradiation at the plurality of locations.

19. (Original) The apparatus according to claim 18, and comprising a secondary electron detector, which is adapted to measure a secondary electron current emitted from the sample responsive to the beam of charged particles, and wherein the controller is adapted to create the map so as to indicate the secondary electron current together with the specimen current.

20. (Original) The apparatus according to claim 18, wherein the particle beam source is adapted to direct the beam of charged particles toward one or more reference locations that are adjacent to at least one of the plurality of locations of the irradiated contact openings, and

wherein the current measuring device is further adapted to measure reference values of the specimen current in response to the irradiation of the reference locations, and

wherein the controller is adapted to subtract the reference values from the specimen current measured in response to the irradiation of the contact openings to generate subtracted current values, and to use the subtracted current values in creating the map.

21. (Original) The apparatus according to claim 18, wherein the map is indicative of at least one of a characteristic depth and a characteristic width of the contact openings at each of the plurality of locations.

22. (Original) The apparatus according to claim 18, wherein the map is indicative of non-uniformities in a process used to create the contact openings.

23. (Original) The apparatus according to claim 22, wherein the non-uniformities comprise variations over the region of the sample.

24. (Original) The apparatus according to claim 22, wherein the non-uniformities comprise variations between different, first and second samples.

25. (Original) The apparatus according to claim 22, wherein the controller is adapted to apply corrective action to the process responsively to the map.

26. (Original) The apparatus according to claim 18, wherein the map is indicative of an alignment between the contact openings in the second layer and a structure in the first layer.

27. (Original) The apparatus according to claim 18, wherein the sample comprises a semiconductor wafer.

28. (Original) The apparatus according to claim 27, wherein at least some of the locations are located on different dies of the wafer.

29. (Original) The apparatus according to claim 18, wherein the locations to be irradiated are selected such that the one or more of the contact openings in each location among the plurality of locations are characteristic of the contact openings in a respective area of the location.

30. (Original) The apparatus according to claim 18, wherein at least one of the contact openings is a contact hole.

31. (Original) The apparatus according to claim 18, wherein at least one of the contact openings is a trench.

32. (Original) The apparatus according to claim 18, wherein the contact openings have side walls and a bottom, and wherein the beam is angled so that more of the charged particles strike the side walls than strike the bottom.

33. (Original) The apparatus according to claim 18, wherein the controller is adapted to assess, based on the specimen current, whether a contaminant residue is present within the contact openings.

34. (Original) The apparatus according to claim 18, wherein the particle beam source is adapted to negatively precharge the surface of the sample in proximity the contact openings, so as to facilitate measurement of the specimen current by the current measuring device.

35. (Currently Amended) A method for process monitoring, comprising:

   receiving a sample having a first layer that is at least partly conductive and a second layer formed over the first layer, following production of a structure in the first layer and contact openings in the second layer;

   directing a beam of charged particles along a beam axis that deviates substantially in angle from a normal to a surface of the sample to irradiate one or more of the contact openings in each of a plurality of locations distributed over at least a region of the sample, wherein the deviation in angle is greater than arctan(1/AR), wherein AR is the ratio of depth to diameter of a contact opening from the one or more of the contact openings;

   measuring a specimen current flowing through the first layer in response to irradiation of the one or more of the contact openings at each of the plurality of locations; and

   assessing an alignment between the contact openings in the second layer and a structure in the first layer at each of the plurality of locations responsively to the measured specimen current.

36. (Original) The method according to claim 35, wherein assessing the alignment comprises creating a map of at least the region of the sample indicative of the alignment.

37. (Currently Amended) Apparatus for testing a sample having a first layer that is at least partly conductive and a second layer formed over the first layer, following production of a structure in the first layer and contact openings in the second layer, the apparatus comprising:

   a particle beam source adapted to direct a beam of charged particles along a beam axis that deviates substantially in angle from a normal to a surface of the sample so as to irradiate one

or more of the contact openings in each of a plurality of locations distributed over at least a region of the sample, wherein the deviation in angle is greater than arctan(1/AR), wherein AR is the ratio of depth to diameter of the one or more contact openings;

a current measuring device adapted to measure a specimen current flowing through the first layer in response to irradiation of the one or more of the contact openings at each of the plurality of locations; and

a controller adapted to assess an alignment between the contact openings in the second layer and a structure in the first layer at each of the plurality of locations responsively to the measured specimen current.

38. (Original) The apparatus according to claim 37, wherein the controller is adapted to create a map of at least the region of the sample indicative of the alignment.